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Innovation Pathway

2025: A Bumper Year for Sci-tech Innovation

By Staff Reporters

In 2025, China once again enjoyed a bumper year of scientific and technological innovation, with major sci-tech achievements emerging one after another. China has become one of the economies with the fastest-growing innovation capacity in the world.

Collaborative breakthroughs

On January 20, 2025, the Experimental Advanced Superconducting Tokamak, known as China's "artificial sun," maintained a steady-state high-confinement plasma operation for a remarkable 1,066 seconds, setting a new world record.

This marks a major leap forward in China's fusion power research from basic science to engineering practice, Wang Teng, an associate researcher at the Institute of Plasma Physics, Chinese Academy of Sciences, told *Science and Technology Daily*.

On October 15, 2025, the Chuanke 1 well of China National Petroleum Corporation was drilled to a depth of over 10,000 meters. This breakthrough was due to the joint effort of enterprises, universities and research institutions.

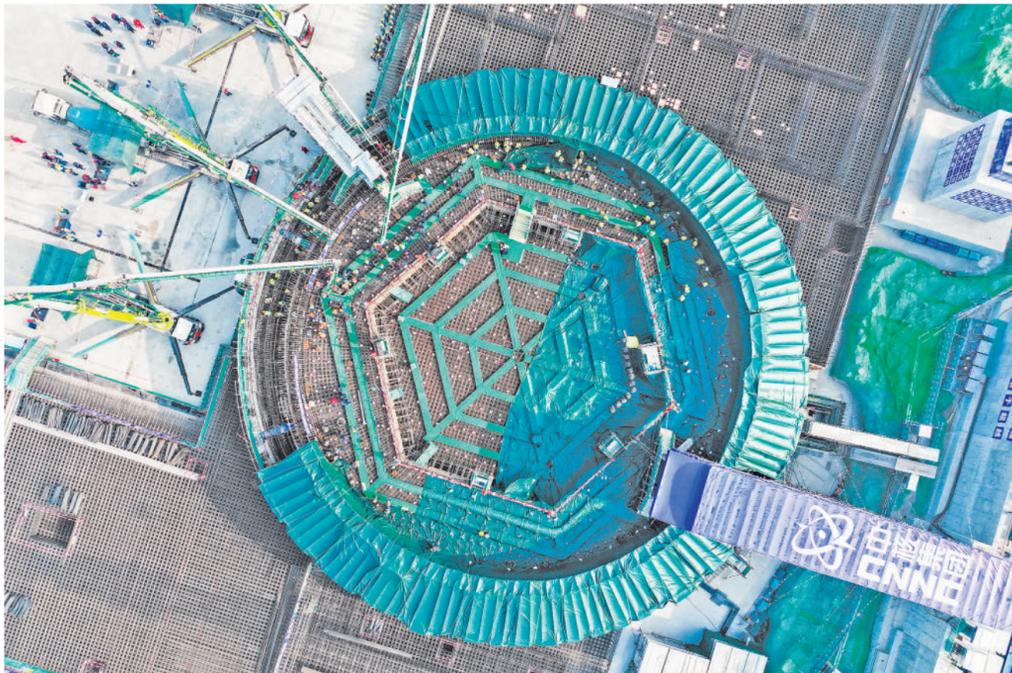
Collaborative R&D has improved the innovation mechanisms nationwide. Major national sci-tech programs, including the BeiDou Navigation Satellite System, China's lunar exploration program and the CR450 EMU, next-generation, world-record-setting high-speed train, have all benefited from collaborative innovation.

The Recommendations of the Central Committee of the Communist Party of China for Formulating the 15th Five-Year Plan for National Economic and Social Development also stress improving the new system for mobilizing resources nationwide and adopting unconventional measures to drive decisive breakthroughs in core technologies across entire chains in key fields such as integrated circuits, industrial machine tools, high-end equipment, basic software, advanced materials and biomanufacturing.

Innovation-driven economy

In terms of emerging and future industries such as AI, industrial robots, quantum computing, clean energy and low-altitude economy, China has maintained a rapid and stable development momentum in recent years.

See page 4



Construction of the Xuwei Nuclear Heating and Power Plant in Jiangsu province, eastern China, begins with the pouring of concrete for the nuclear island of its first unit, January 16. As the world's first project to supply low-carbon steam from nuclear energy to the petrochemical industry, it offers an innovative pathway for green transformation in high-carbon sectors. (PHOTO: XINHUA)

STI Frontier

Shield Machines Rendezvous under Yangtze River

By WANG Xiaoxia & DU Peng

Under the lower tributaries of the Yangtze River in China's eastern Jiangsu province, the "riverbed docking section," or completion of the Jiangyin-Jingjiang Yangtze River Tunnel, was officially celebrated recently.

Constructed by China First Highway Engineering Co., Ltd. (CFHEC), the successful completion of this major infrastructure project, conquering the world-class challenge of a shield-tunnelling machines rendezvous beneath the mighty Yangtze's riverbed, despite being confronted with high water pressure and highly permeable strata, is a defining breakthrough in modern engineering.

Bold decision

In February 2023, during the excavation of the 6.4km tunnel, the shield machine unexpectedly encountered an

accident and was unable to continue moving forward. After much deliberation, the project team of CFHEC made a bold decision to use a new shield machine from the other side of the river, to recover its stranded twin and make a rendezvous beneath the riverbed.

CFHEC principal engineer Yao Zhanhu said the biggest challenge in the rendezvous was to ensure that the new shield machine could accurately find its direction in the geological environment of high-pressure, water-rich and sandy strata with surging undercurrents.

"We have developed a visualization system, installing cameras and various sensors on the shield machine to collect real-time data and information about the surrounding environment, achieving all-round monitoring of the tunneling process," said Zhang Lei, deputy manager of the project.

In the summer of 2024, the two

shield machines closed in on the critical moment of docking. On the surveillance screen, the "cross" bullseye symbolizing the target gradually coincided. The rendezvous between the two was achieved with just 2mm of vertical error and no horizontal deviation.

Control of the water

A successful rendezvous was only the first step. Surrounding the two shield machines was the soft and unstable soil layer rich in groundwater. To carry out subsequent construction in the section, it was necessary to control the strata where the undercurrents surged.

"One of the best ways to control water is to freeze it." After conducting systematic argumentation, Academician Chen Xiangsheng of the Chinese Academy of Engineering accepted the asymmetric freezing method proposed by the project team.

See page 4

Enterprises' Principal Role Reinforced in Innovation

By Staff Reporters

The principal role of enterprises in technological innovation should be reinforced, according to the Recommendations of the Central Committee of the Communist Party of China (CPC) for Formulating the 15th Five-Year Plan (FYP) for National Economic and Social Development (hereinafter referred to as Recommendations).

This ongoing strengthened strategic orientation has also boosted the confidence of entrepreneurs, according to *Science and Technology Daily (ST Daily)* interviews with many business leaders. It is envisaged that during the 15th FYP period (2026-2030), enterprises will feature more prominently in the national

innovation system, leading to breakthroughs in key technologies and exploration of emerging fields.

Key tech breakthroughs

During the 14th FYP period (2021-2025), the innovation strength of Chinese enterprises has been consistently improved. In 2024, China's total R&D expenditure, ranking second in the world, reached 3.6 trillion RMB, of which 77 percent was investment from enterprises.

The Recommendations encourage enterprises to make more investments in basic research, and underscore developing new drivers of economic growth such as quantum technology, biomanufacturing, hydrogen and nuclear fusion power, brain-computer interfaces, embodied artificial intelligence, and 6G

mobile communications.

To date, enterprises have made breakthroughs in multiple key technologies. For example, Chinese enterprise CIQTEK, a high-end scientific instruments developer and manufacturer, has realized localization of basic scientific research instruments such as electron paramagnetic resonance spectrometers, and developed the world's first low-temperature scanning nitrogen-vacancy probe microscope.

Quantum precision measurement, as one of the quantum information technologies closest to industrial breakthroughs, is now at a critical stage of moving from the laboratory to application, said Xu Kebiao, vice president of CIQTEK. See page 3

International Cooperation

China-Spain Industrial Chain Cooperation Deepened

Edited by WANG Xiaoxia

China and Spain have expanded their cooperation areas in recent years and established a dynamic and resilient industrial and supply chain cooperation relationship, benefiting both with tangible achievements.

More and more Chinese new energy vehicles can be seen in the streets of Spanish cities, the result of the increasing deep integration of the automobile industrial chains of the two countries.

At the end of 2024, Chinese automobile producer Chery and Spanish company Ebro-EV Motors launched their first model at their joint venture factory in Barcelona. In July 2025, BYD's hybrid vehicles topped the sales in Spain with a market share of 10 percent.

The bilateral cooperation is complementary. Spain has rich experience in vehicle manufacturing and parts supply and has established a sales network in Europe. Chinese enterprises have advantages in new energy technology, intelligent configuration and cost control.

Chinese automakers produce in Spain and cooperate with local suppliers, creating numerous job opportunities for the local people, said Marta Blazquez, president of Spain's Federation of Automotive Dealers Associations, in an interview with *People's Daily*.

Also, China encourages Chinese enterprises to invest in Spain, expanding cooperation in the fields of green energy and power battery industrial chains and emerging industries such as AI and advanced manufacturing, creating new opportunities for bilateral cooperation.

During the China International Industry Fair held in September 2025, the two countries announced plans to co-establish an industrial mother machine supply chain promotion center. See page 2

WEEKLY REVIEW

Shenzhou-20 Brings Retired Extravehicular Spacesuit Back to Earth

The return capsule of the Shenzhou-20 spacecraft landed at the Dongfeng landing site in north China's Inner Mongolia autonomous region on January 19 without any crew onboard. Among the items brought back to Earth was a retired extravehicular spacesuit. Known as extravehicular spacesuit B, it is the first spacesuit used in China's space station to meet the extended service target of supporting 20 spacewalks over a four-year period.

Chinese Satellite Data Signals Iceberg Near Complete Breakup

Data from China's Fengyun-3D satellite show that A23a, once the largest iceberg in the world, is approaching the final phase of its breakup, the China Meteorological Administration said. True-color images with a resolution of 250 meters reveal that the iceberg's main mass has diminished to about 506 square kilometers — less than one-eighth of its original area of 4,170 square kilometers when it separated from an Antarctic ice shelf in 1986.

UN High Seas Treaty Enters into Force

The Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction officially entered into force on January 17. The treaty establishes the world's first comprehensive legal framework for protecting and sustainably using marine biodiversity in areas beyond national jurisdiction, commonly known as the high seas.

Robot Learns Human-like Lip Movements

Researchers from Columbia University have developed a robot that can learn lip motions for tasks like speech and singing. Not relying on preset rules, the robot learned this by observing its own reflection and analyzing videos of human speech available online. Researchers believe this breakthrough could help robots finally cross the uncanny valley.

New Graphic



CHINA HAS REMAINED THE WORLD'S LARGEST ONLINE RETAIL MARKET FOR 13 consecutive years

DIGITAL CONSUMPTION >23.8 trillion RMB

Source: China's Ministry of Commerce
Designed by SONG Ziyao / Science and Technology Daily

WECHAT ACCOUNT



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